I IIIE: METHOD AND APPARATUS FOR DRY-ETCHING HALF-TONE PHASE-SHIFT FILMS, HALF-TONE PHASE-SHIFT PHOTOMASKS AND METHOD FOR THE PREPARATION THEREOF, AND SEMICONDUCTOR CIRCUITS AND METHOD FOR THE FABRICATION THEREOF Inventor: Takaei SASAKI et al

Appln. No.: New Application Docket No.: 101136-00103

Fig. 1

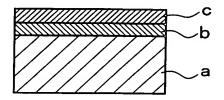


Fig. 2

Flow	Electron Beam Patterning Process	Laser Beam Patterning Process
Receipt of Blank		
Exposure/Patterning	Electron Beam Patterning Device	Laser Beam Patterning Device
\\	Spray, Dip, Paddle Systems	
Development	Organic Solvent Development Alkali Development	Alkali Development
Post-Baking	Hot Plate Oven Convection Oven	Generally, any treatment is not required.
De-scumming	Plasma De-scumming Device	Generally, any treatment is not required.
	Wet Etching and Dry-Etching	
Removal of Resist	Solvent Pealing, Ashing	Exposure of Whole Surface/Alkali Pealing, Solvent Pealing, Ashing
Washing 	Sheet-Fed Acid-Treatment, Physical Scrubbing, or the like	
To Inspection Step		

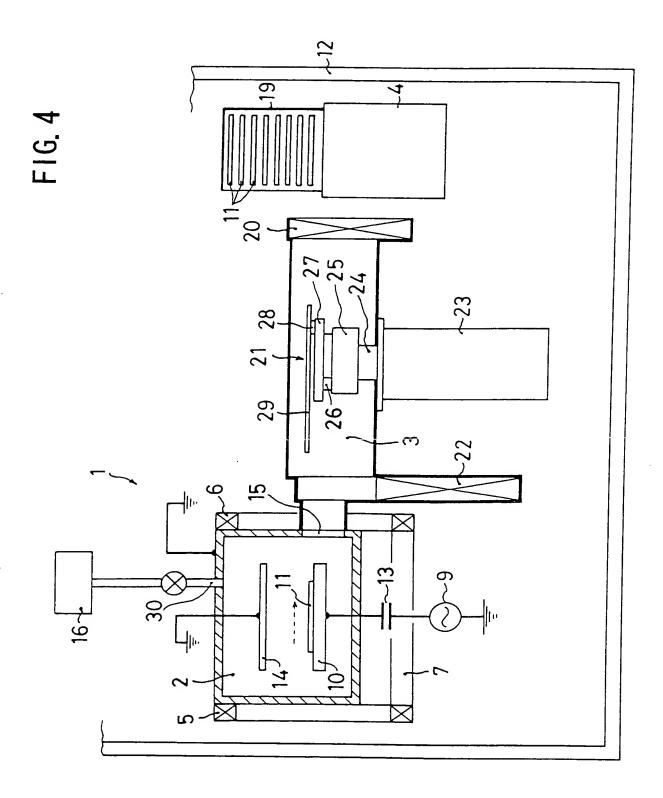
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THE: METHOD AND APPARATUS FOR DRY-ETCHING HALF-TONE PHASE-SHIFT PILMS, HALF-TONE PHASE-SHIFT PILMS, HALF-TONE PHASE-SHIFT PHOTOMASKS AND METHOD FOR THE 'PREPARATION THEREOF, AND SEMICONDUCTOR CIRCUITS AND METHOD FOR THE FABRICATION THEREOF Inventor: Takaei SASAKI et al Appln. No.: New Application Docket No.: 101136-00103

(270° Variable) 26 Rotating Magnetic Field 9 S **م**ا

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ITIIO: METHOD AND APPARATUS FOR BRY-ETCHING HALF-TONE PHASE-SHIFT FILMS, HALF-TONE PHASE-SHIFT PHOTOMASKS AND METHOD FOR THE PREPARATION THEREOF, AND SEMICONDUCTOR CIRCUITS AND METHOD FOR THE FABRICATION THEREOF Inventor: Takaei SASAKI et al Appln. No.: New Application Docket No.: 101136-00103



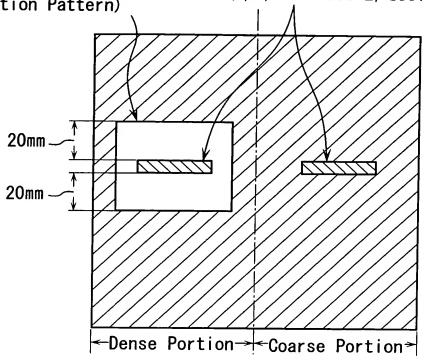
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Inventor: Takaei SASAKI et al Appln. No.: New Application Docket No.: 101136-00103

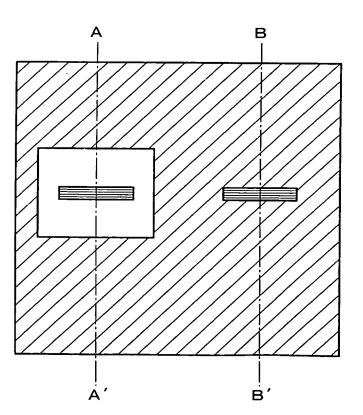
Fing. 5 A

Completely Removed Pattern (Periphery of the Dimension-Evaluation Pattern)

Dimension-Evaluation Pattern (L/S, Isolated L, Isolated S)



Fing. 5B



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Isolated S

Isolated L

Inventor: Takaei SASAKI et al Appln. No.: New Application Docket No.: 101136-00103

Fing. 6 A

Test Pattern on Dense Portion(A-A')

Fing. 6 B

Test Pattern on Coarse Portion(B-B')

(a) EB Patterning

(b) Development

(c) Etching

(d) Removal of Resist

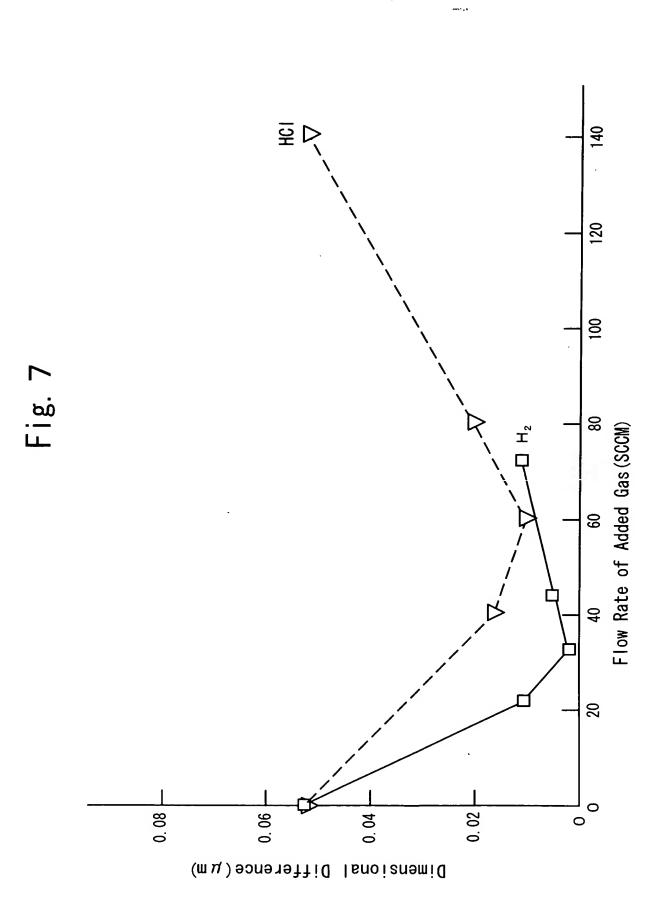
(a) EB Patterning

(b) Development

(c) Etching

-Isolated S

Isolated L



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ITILE. METHOD AND APPARATUS FOR DRY-ETCHING HALF-TONE PHASE-SHIFT PHOTOMASKS AND METHOD FOR THE PREPARATION THEREOF, AND SEMICONDUCTOR CIRCUITS AND METHOD FOR THE FABRICATION THEREOF Inventor: Takaei SASAKI et al Appln. No.: New Application Docket No.: 101136-00103

IIIIG: MFTH(II) AND APPARATUE FOR DRY CTURING HALP-TONE PHASE-SHIFT FILMS, HALF-TONE PHASE-SHIFT PHOTOMASKS AND METHOD FOR THE PREPARATION THEREOF, AND SEMICONDUCTOR CIRCUITS AND METHOD FOR THE FABRICATION THEREOF Inventor: Takaei SASAKI et al

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Fig. 8

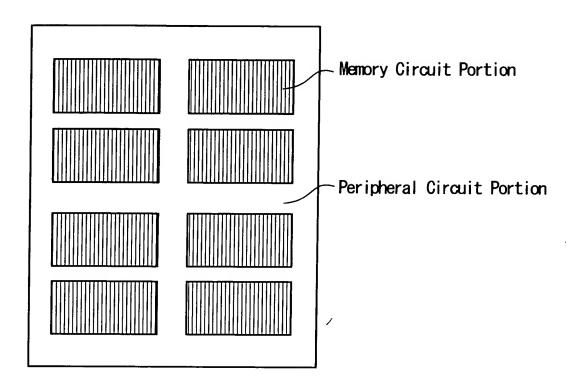
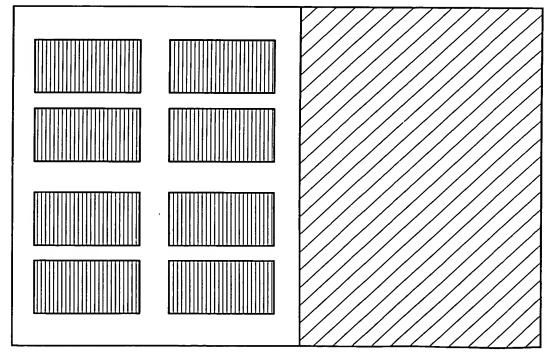


Fig. 9



Memory Circuit Portion

Logic Circuit Portion